

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security - Animals and Their Systems, Production and Health

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	15%	20%	20%	30%
302	Nutrient Utilization in Animals	15%	20%	20%	20%
303	Genetic Improvement of Animals	15%	17%	17%	20%
307	Animal Management Systems	15%	18%	18%	0%
311	Animal Diseases	5%	10%	10%	20%
312	External Parasites and Pests of Animals	5%	5%	5%	0%
313	Internal Parasites in Animals	2%	5%	5%	0%
315	Animal Welfare/Well-Being and Protection	5%	2%	2%	7%
404	Instrumentation and Control Systems	5%	0%	0%	0%
511	New and Improved Non-Food Products and Processes	3%	0%	0%	0%
512	Quality Maintenance in Storing and Marketing Non-Food Products	5%	0%	0%	0%
601	Economics of Agricultural Production and Farm Management	4%	1%	1%	1%
602	Business Management, Finance, and Taxation	3%	1%	1%	1%
604	Marketing and Distribution Practices	3%	1%	1%	1%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	60.0	3.0	105.0	8.0
Actual Paid Professional	78.0	9.0	100.0	9.7
Actual Volunteer	50.0	0.0	50.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1229229	192110	1739185	777852
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1229229	116610	1739185	423723
1862 All Other	1890 All Other	1862 All Other	1890 All Other
4761695	121839	12698999	197323

V(D). Planned Program (Activity)

1. Brief description of the Activity

This plan of work includes broad and extensive research and extension programs. NC Agricultural Research Service scientists will conduct research projects to study methods to improve the efficiency of animal production. Research will focus on methods to improve reproductive performance, nutrient utilization, and genetic influence on growth and reproduction. Scientists will also work to improve animal management systems, decrease the incidence of animal diseases and parasites (external and internal) and improve the management of animal and agricultural pests. Species and commodity groups included in this plan of work are also very broad and include poultry such as turkeys, broiler chickens, and table-egg chickens. The plan of work also includes swine, fish such as flounder, and cattle such as beef and dairy, and numerous pests such as house flies. Research will include many phases of commodity production such as meat and dairy goats, chicken breeders (both broiler and table egg birds), commercial broilers (commercial refers to those animals produced for meat), breeder turkeys, commercial turkeys, swine breeders, commercial swine, all phases of aquaculture and beef and dairy production. Disciplines that will be involved include nutrition, physiology, reproductive physiology, genetics, virology, bacteriology, microbiology, mycology, entomology, and many animal management systems such as grazing and forage management programs, hatchery management, feeding and drinking water systems, litter and bedding management, lighting programs, and breeder selection and management. A very important part of this plan of work is to transfer technology and knowledge to our stake-holders and clientele. Therefore, an extensive outreach effort through Cooperative Extension will be conducted by field and campus based faculty who are based on-site as well as being located across the state and based in local communities. Stakeholders and clientele will be directly engaged in many ways including workshops, conferences, discussion groups, one-on-one teaching, demonstrations, field days, short-courses, continuing education classes, and scientific meetings. Indirect methods to reach stake-holders and clientele will include long-distance education, newsletters, web sites, newspaper releases, television and radio programs, trade journals, scientific journals, and popular press articles. Participants and programs will be evaluated at least annually for success, progress, and effectiveness. Special educational programs focused on limited resource farmers will continue to be a priority for NCA&T focused Extension efforts in pasture based production systems, aquaculture and alternative breeds.

2. Brief description of the target audience

The target audience will be primarily aquaculture, poultry, livestock producers, small-scale limited resource, beginning and underserved growers and agribusiness personnel in North Carolina. However, since North Carolina producers are some of the best in the world, ultimately, producers and agribusiness personnel across the country and around the world will be the primary audience. In addition, the audience will include personnel in other state and federal agencies, local, state and federal politicians, and other

stakeholders including the general public.

3. How was eXtension used?

A number of animal systems Communities of Practice are available in eXtension, providing a valuable resource for production practices, animal health and management, and marketing. These resources are available to extensionists, producers and others supporting the food animal industries.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	200000	900000	42000	45000

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2013

Actual: 1

Patents listed

Livestock Insect-Removal System and Related Methods

Appl # 13/668,215 US

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	18	163	181

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Highly focused non-degree credit group training activities to be conducted

Year	Actual
2013	1656

Output #2

Output Measure

- Relevant and impacts focused research projects to be conducted

Year	Actual
2013	110

Output #3

Output Measure

- Local, Area, Regional, and State Conferences to be Conducted

Year	Actual
2013	20

Output #4

Output Measure

- Local, Area, Regional, and State Educational Tours to be Conducted

Year	Actual
2013	30

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Additional income gained by animal producers improved planning, marketing, and financial practices
2	Net income increased by producers improving animal husbandry practices
3	Number of animal producers adopting improved animal husbandry practices
4	Number Livestock Producers Adopting and Applying Improved Planning and Financial Management Practices
5	Number of new technologies developed to prevent/treat animal diseases
6	New organic, farmers and agritourism markets established by individual entrepreneurs
7	Growers Adopting Improved Business Management Practices

Outcome #1

1. Outcome Measures

Additional income gained by animal producers improved planning, marketing, and financial practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	16000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustaining economic viability of animal and poultry producers.

What has been done

A wide array of educational programs and demonstrations provided Extension recommendations for husbandry best management, improved production planning, marketing and financial management. These programs were provided for all groups of livestock producers, poultry producers and aquaculture.

Results

Statewide, 9,756 adopted husbandry, production planning, marketing, and financial management practices to improve profitability and sustainability. These and other growers reports benefiting from these practices with additional profit over \$16 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
312	External Parasites and Pests of Animals
313	Internal Parasites in Animals
315	Animal Welfare/Well-Being and Protection

Outcome #2

1. Outcome Measures

Net income increased by producers improving animal husbandry practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	16000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Enhancement of dietary nutrient utilization by increasing particle grind size of soybean meal or corn.

What has been done

Several studies were conducted in which particle size of soybean meal or corn was increased for a fraction of the complete diet. Increasing about 25-50% of the corn or soybean meal to about 1,500 microns improved the digestibility of the complete diet, especially when the diet contains poorly digestible protein or carbohydrates. Improvements in feed conversion without adverse effects on growth performance, as well as reduced nitrogen excretion was observed when a mean particle size was increased in the diet of broilers.

Results

Over the past 2 years, most of the integrated poultry production companies in North Carolina have realized the benefit of increasing the particle grind size of a portion of the pelleted feed for poultry. Those who have applied this technology have observed a 3% improvement in feed conversion, significantly improved nutrient utilization, reduced incidence of enteric help problems, and a reduction of ammonia emissions from poultry operations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
312	External Parasites and Pests of Animals
313	Internal Parasites in Animals
315	Animal Welfare/Well-Being and Protection

Outcome #3

1. Outcome Measures

Number of animal producers adopting improved animal husbandry practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	9756

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Because of public pressure to discontinue the practice of including sub-therapeutic antibiotics in animal feed, U.S. pork producers are seeking natural, research-proven and affordable solutions for managing growth, preventing disease, and enhancing the overall health of pigs, particularly

during the time surrounding weaning.

What has been done

NC A&T scientists conducted a series of experiments evaluating the effects that sow diets supplemented with oat or yeast culture and fed during gestation and lactation had on piglet intestinal health and growth.

Results

It was discovered that including oat in the diet of sows was beneficial to piglets. In these experiments, piglets born from sows given oat supplemented diets weighed more at birth, lost the least amount of weight during a post weaning period of 14 days, and had decreased incidence of diarrhea.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
312	External Parasites and Pests of Animals
313	Internal Parasites in Animals
315	Animal Welfare/Well-Being and Protection

Outcome #4

1. Outcome Measures

Number Livestock Producers Adopting and Applying Improved Planning and Financial Management Practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a need for an alternative to weekly cattle auctions in order to increase profitability of feeder cattle.

What has been done

In Wilkes County, N.C., Cooperative Extension established the Feeder Cattle Marketing Program. The program is designed to increase profitability of feeder cattle primarily from smaller producers by commingling and grouping cattle in uniform lots. This allows producers to obtain premium prices that they could not obtain on the average weekly auction market. All cattle sold through these sales are graded by trained personnel. Cattle are grouped in lots based on grade, sex and breed, and penned with similar cattle. Another important factor influencing selling price is weighing condition. Graded sale's cattle are sold on a weigh-in basis whereas with weekly auctions, cattle are sold on a weigh-out basis.

Results

Approximately 68 area beef cattle producers participated in the April 2013 Feeder Cattle Marketing Program, marketing 672 head of cattle. With average premiums being \$0.05 per pound and average calf weights being 605 pounds, this amounts to an extra \$30.25 per animal, for a total additional income of \$20,328 for area beef cattle producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

Outcome #5

1. Outcome Measures

Number of new technologies developed to prevent/treat animal diseases

2. Associated Institution Types

- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In the event of a foreign animal disease outbreak in the United States, a rapid and humane method for on-farm swine depopulation will be required. Given the extraordinary number of animals potentially involved, and the design of current swine confinement buildings, methods relying on the handling and restraint of individual animals will prove much too slow to stem the spread of disease.

What has been done

An NCSU project is underway is to identify, evaluate, and disseminate efficient practical methods to mass depopulate swine on farms in a local, regional, or national emergency. This involves evaluating the application of CO₂ supplied by a bulk liquid CO₂ tanker trucks as well as the possibility of generating CO₂ on-site. In this effort, the use of Computational Fluid Dynamics (CFD) has proved to be a very powerful tool for evaluating transient CO₂ concentrations during wash-in and wash-out period in the truck beds used for animal loading, treatment, and disposal.

Results

This work pertains to national emergency preparedness, and in the event of a contagious swine disease outbreak in the North Carolina or elsewhere in the nation or world, this research will be of significant value in containing the disease and minimizing the consequences.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #6

1. Outcome Measures

New organic, farmers and agritourism markets established by individual entrepreneurs

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Growers Adopting Improved Business Management Practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Dairy farm numbers in North Carolina have decreased over time, and the volume of fluid milk produced in North Carolina is currently less than half of the amount consumed by the people of North Carolina. The ongoing decline of the North Carolina dairy industry must be slowed or reversed in order to ensure the availability of milk and dairy products to the state's population.

What has been done

As part of NC Dairy Advantage, a new Farm Assessment Program was developed to provide a comprehensive measurement of a dairy farm's performance. Each aspect of the dairy farming operation is analyzed, from milk quality to record-keeping, and goals, strengths, and weaknesses also are assessed. In 2012 and 2013, NC Dairy Advantage conducted two farm assessments to pilot the new program and to evaluate the surveys and data collection methods that had been developed. Two additional assessments were started in 2013, with completion expected in early 2014.

Results

Collecting and reporting data that measure the impacts of the NC Dairy Advantage Farm Assessment program will provide all North Carolina dairy producers with benchmarking data and management goals, which are anticipated to have broad financial impact across the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

604 Marketing and Distribution Practices

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Constantly changing environmental and economic conditions (weather, economic climate, feed prices, regulatory climate) influence producers' abilities to accommodate change and innovation, while ensuring the sustainability of their enterprises. Economic pressures continue to influence federal, state and local support for research and extension activities. Regulatory and other governmental policies influence the educational and research capacities of our programs and present challenges to producers, processors, and marketers of animal products to comply with emerging and often expensive regulations. And in an environment of reduced appropriated funding, the program competition for existing funds becomes greater. Nevertheless, emphasis is placed on those research and extension opportunities which will have enduring benefits to farmers, their families, businesses, communities and their industries, in terms of economic, environmental, social and quality of life considerations.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation of faculty activity reports, intellectual property creation (invention disclosures), peer reviewed journal articles, and data from our Extension Reporting System shows that our research and extension efforts in this planned program area are successful in engaging a wide array of animal agriculture producers, processors and marketers. The data indicate that delivery of relevant research information and research backed production best management practices are associated with significant improvement in profitability of livestock and poultry operations. Faculty are successful in influencing individual producers as well as production companies that our research findings can generate additional profitability in their operations, sometimes with added environmental benefit. The information also demonstrates the the research and extension programs at our institutions are creative environments for our faculty to be productive in making new discoveries, publishing in quality journals, and creating new business opportunities.

Key Items of Evaluation

Qualitative and quantitative data collected show that our efforts in this planned program area are having significant benefit to users and to the state. Nevertheless, we are

challenged to keep our evaluation tool kit in lockstep with the regularly changing research and extension needs. We will continue to refine our reporting and data collection system to most effectively collect data that represent the real world situation with respect to the impacts of our programs.